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Japanese Published Unexamined (Kokai) Patent Publication No. 62-107039; Publication Date: May 18, 1987; Application No. 60-247174; Application Date: November 6, 1985; Int. Cl.[4]: C22C 9/06 H05K 9/00; Inventor: Junji Miyake; Applicant: Nippon Mining Co., Ltd.; Japanese Title: Taishokusei ni Sugureta Denjiha Shiieudozaiyou Dougoukin (Copper Alloy for an Electromagnetic Wave Material that Demonstrates High Corrosion Resistance)

Specification

1. Title of Invention

Copper Alloy for an Electromagnetic Wave Material that Demonstrates High Corrosion Resistance

2. Claim(s)

1. A copper alloy for an electromagnetic wave material that demonstrates high corrosion resistance, characterized by being composed of the following components at the following weights: Pb at 0.005 to 0.1 wt%; Co at 0.01 to 1.0 wt%; Cu and an inevitable impurity for the remaining portion.

2. A copper alloy for an electromagnetic wave material that demonstrates high corrosion resistance, characterized by being composed of the following components at the following weights: Pb at 0.005 to 0.1 wt%; Co at 0.01 to 1.0 wt%; one or two types or more selected from Al, Sn, Mg, Ni, Te, In, Cd, As, V, Zr, Mn, B, Cr, Ti, Si, Zn, Be, Fe and P at 0.01 to 1.0 wt%; Cu and an inevitable impurity for the remaining portion.

3. Detailed Description of the Invention

(Purpose)

This invention pertains to a copper alloy that demonstrates high corrosion resistance as an electromagnetic wave shielding material.

[Prior Art and the Problem]

In the recent years, it has been demanded that the boxes of electronics are formed using an electromagnetic wave shielding material so as to protect an electronic circuit from external jamming and prevent the leakage of unnecessary electric waves to the outside, which are generated from an oscillator circuit.

There are various types of the shielding method for the electromagnetic wave, such as a covering with a metal foil, a zinc thermal spray, an application of conductive paint and a molding with conductive resin. These methods are used according to the purposes. Among the methods, the method by the metal foil has recently been widely used since it is an economical means and facilitates covering the boxes of electronics. As for conventional metal foils, electrically conductive metal foils are used, such as tough pitch copper, deoxidized phosphoric copper and oxygen free copper. The metal foils are corroded with Ci ions depending on the environment in which they are used to sometimes deteriorate the shielding effect. In particular, the frequency in the deterioration of the shielding effect increases in environments including the atmospheric air of plants in the city and around the city, exhaust gases of vehicles, and high temperature and humidity in

summer. Accordingly, a highly conductive electromagnetic wave shielding metal foil that demonstrates sufficient corrosion resistance even under such environments is demanded.

(Constitution of the Invention)

As a result of a study taking such circumstances into consideration, the invention offers a copper alloy for an electromagnetic wave shielding material that demonstrates high corrosion resistance, characterized by being composed of the following components at the following weights: Pb at 0.005 to 0.1 wt%; Co at 0.01 to 1.0 wt%; Cu and an inevitable impurity for the remaining portion and by being composed of the following components at the following weights: Pb at 0.005 to 0.1 wt%; Co at 0.01 to 1.0 wt%; one or two types or more selected from Al, Sn, Mg, Ni, Te, In, Cd, As, V, Zr, Mn, B, Cr, Ti, Si, Zn, Be, Fe and P at 0.01 to 1.0 wt%; Cu and an inevitable impurity for the remaining portion.

(Detailed Description of the Invention)

Reasons for limiting to the aforementioned alloy components and contents that constitute the alloy of the invention are described next.

The reasons for limiting the amount of Pb contained to 0.005 to 0.1 wt% are as follow. If the amount of Pb contained is below 0.005 wt%, the effect in improvement of corrosion resistance is not identified. If the amount of Pb contained exceeds 0.1 wt%, the effect in improvement of corrosion resistance saturates whereas hot brittleness occurs to cause a problem on the production. The reasons for limiting the amount of Co contained to 0.01 to 1.0 wt% are as follow. If the amount of Co contained is below 0.01 wt%, the

effect in improvement of corrosion resistance is not identified. If the amount of Co contained exceeds 1.0 wt%, the effect in improvement of corrosion resistance saturates whereas the electrical conductivity deteriorates. The reasons for limiting one or two types or more selected from Al, Sn, Mg, Ni, Te, In, Cd, As, V, Zr, Mn, B, Cr, Ti, Si, Zn, Be, Fe and P to 0.01 to 1.0 wt% are as follow. If the amount is below 0.01 wt%, the effect in further improvement of corrosion resistance is not identified. If the amount exceeds 1.0 wt%, the effect in improvement of corrosion resistance saturates whereas the electrical conductivity deteriorates.

(Working Example)

The working example of the invention is described next.

The alloys with various compositions as indicated in Table 1 are fused. While adding a hot rolling and if necessary an annealing, a plate with a 0.1 mm thickness is produced by a cold rolling.

As to corrosion resistance, a testing method as described below is used. More specifically, salt water at 5 wt% is used based on JIS. A salt water spray is applied at an atmosphere at 35°C for 1 hour. After this, the plate is exposed under an environment of high temperature and humidity at 70°C at 90% RH for 23 hours. Defining this as a single cycle (24 hours), the amount of corrosion reduced after ten cycles have been carried out is calculated to evaluate the corrosion resistance.

The electrical conductivity of each sample is also researched.

As is clear in Table 1, the corrosion resistance of the alloys of the invention (No.9 to No.26) significantly improves in comparison with tough pitch copper, deoxidized

phosphoric copper, oxygen free copper or other comparative alloys (No.1 to No.8). The corrosion resistance significantly improves because of adding of a glass component.

(Effect)

As described above, the alloy of the invention demonstrates high corrosion resistance and high electrical conductivity and is most suited as a copper alloy for an electromagnetic wave shielding material.

Table 1

	Pb	Co	Secondary component	Cu	Amount of corrosion reduced (mdd)	Electrical conductivity (%IACS)
Comparative alloy 1	Tough pitch copper					
Comparative alloy 2	Deoxidized phosphoric copper					
Comparative alloy 3	Oxygen free copper					
Comparative alloy 4	[Please refer to the original numerals]			Remaining		
Comparative alloy 5				Remaining		
Comparative alloy 6				Remaining		
Comparative alloy 7				Remaining		
Comparative alloy 8				Remaining		
Alloy of the invention 9			[Please refer to the original description]	Remaining		
Alloy of the invention 10				Remaining		
Alloy of the invention 11				Remaining		
Alloy of the invention 12				Remaining		
Alloy of the invention 13				Remaining		
Alloy of the invention 14				Remaining		
Alloy of the invention 15				Remaining		
Alloy of the invention 16				Remaining		
Alloy of the invention 17				Remaining		
Alloy of the						

invention 18				Remaining		
Alloy of the invention 19				Remaining		
Alloy of the invention 20				Remaining		
Alloy of the invention 21				Remaining		
Alloy of the invention 22				Remaining		
Alloy of the invention 23				Remaining		
Alloy of the invention 24				Remaining		
Alloy of the invention 25				Remaining		
Alloy of the invention 26				Remaining		

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